HALFTONE DOT CORRUPTION

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ATSTRACT

The circular or the elliptical shape of halftone dot gets corrupted in undersampled images at lower values of threshold transmittance. This distortion can be minimized by increasing the threshold value of the film.

INTRODUCTION

FOR many years, the halftone technique is being used widely in graphic arts industry for image reproduction of continuous tone image[1]. Recently, a renewed interest is being taken in this often misunderstood optical phenomenon because of its applicability in logarithmic filtering, level slicing, pseudocolor, and analog-to-digital conversion[2–6]. The interest in the halftone screen characteristics and its effect on the nonlinear operation is, therefore, considered very significant. Bryngdahl[7] had reported the preference of ring-shaped halftone dots over circular dots. The ring shaped halftone screen has been observed to yield quantitatively better tone reproduction than the circular dot screen. Pappu, Kumar and Mehta[8] had experimentally observed, although without theoretical reasoning, the phenomenon that the circular halftone dots get corrupted in undersampled images. This significant observation happens to weaken the assumption made by Marquet and Tsujuichi[9] in their earlier study of dot removal phenomenon in terms of diffraction theory. This study analyzes the corruption phenomenon of circular dots and provides justifiable reasons.

ANALYSIS

The analysis is based fundamentally on two assumptions. (*a*) The transmittance of the original image remains significantly constant over the region of any one cell of the screen. (*b*) A positive high contrast film of infinite gamma is used for halftone photograph.

The halftone screening is completely illustrated in Fig. 1. The linear transmittance function $T^s(x, y)$ of a circular dot screen is shown in Fig. 1 (*a*), where T_m^S and T_m^S are the maximum and minimum transmittances of the screen. While in contact with the original image of tranpmittance T^p, the resulting transmittance ranges from $T_m^S T^p$ to $T_m^S T^p$. In the halftone photograph the tranmittance exceeding threshold transmittance, T^{th}, of the positive high gamma film, will develop to have unit transmittance; otherwise the film becomes opaque. Figures 1 (*c*)-1 (*d*) shows the three different transmittances of halftone photograph corresponding to three values of threshold transmittances (i) $(1 - 1/\sqrt{2}\ (T_m^S - T_m^S)\, T^p \leq T_1^{th} < T_m^S T^p$, (ii) $T_m^S T^p < T_2^{th} > (1 - 1/\sqrt{2})\ (T_m^S - T_m^S)\, T^p$ and (iii) $0 \leq T_3^{th} \leq T_m^S T^p$. It can be seen that the transmittance-geometry of halftoned photograph varies in shape corresponding to different threshold values of the film.

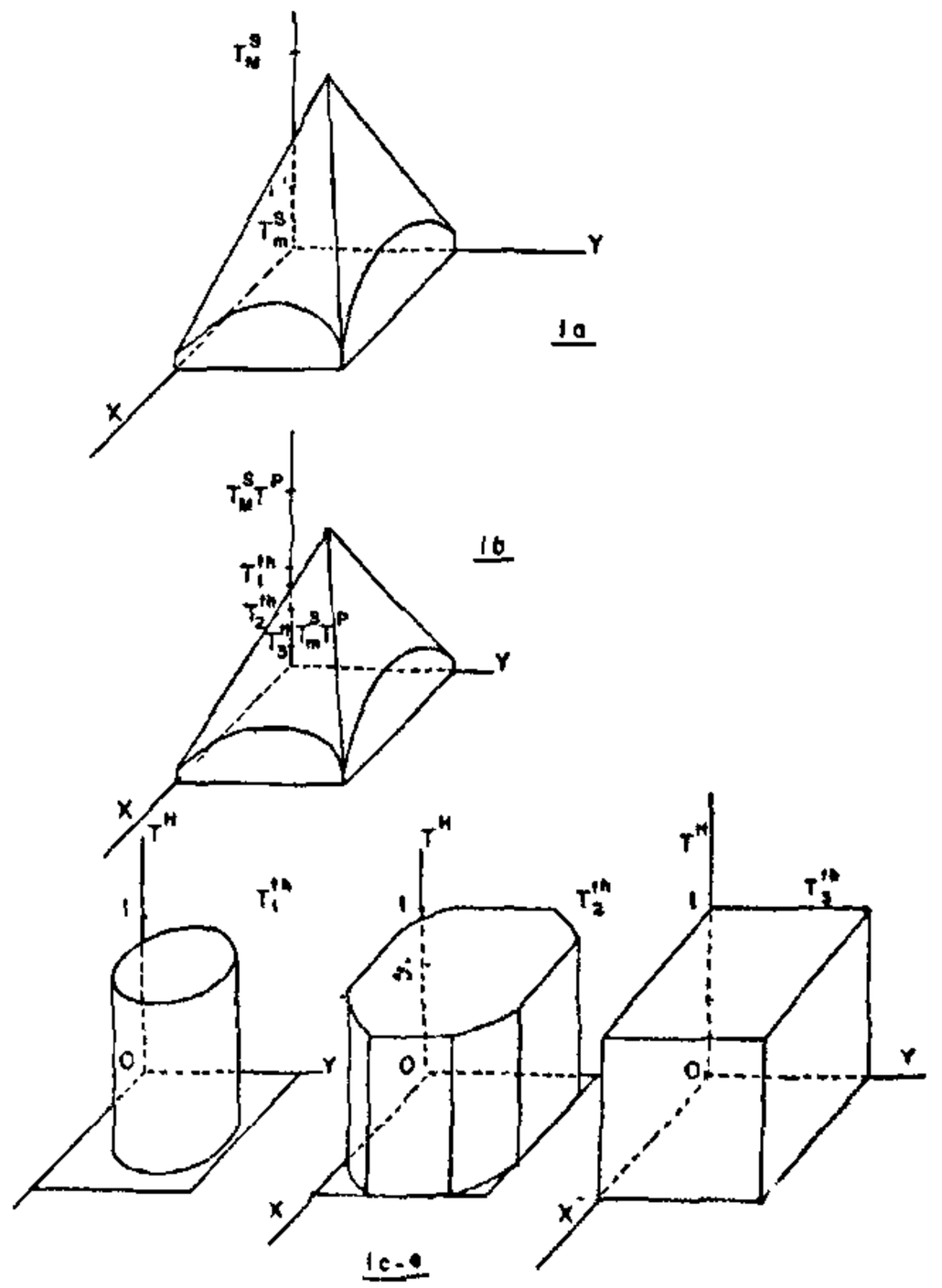
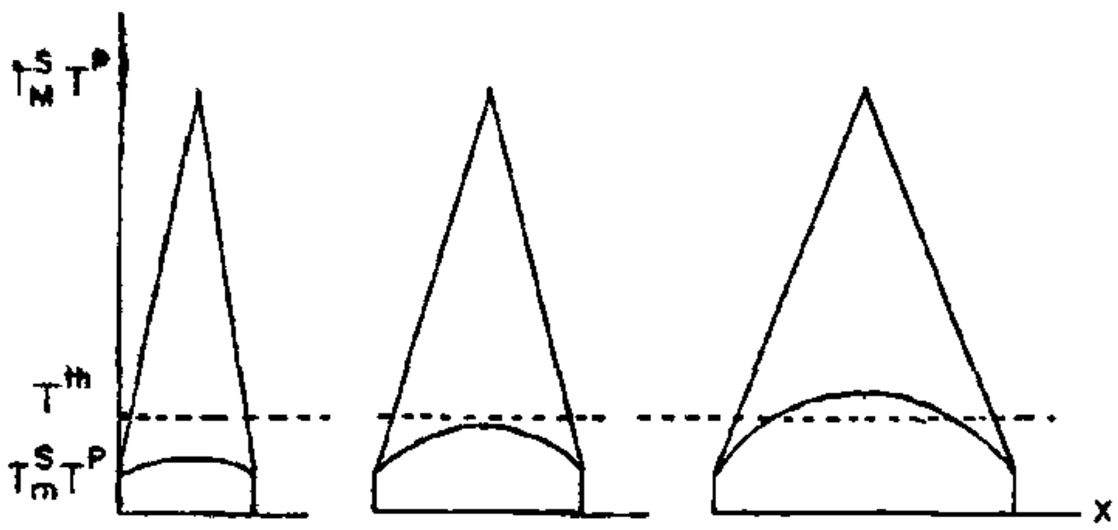


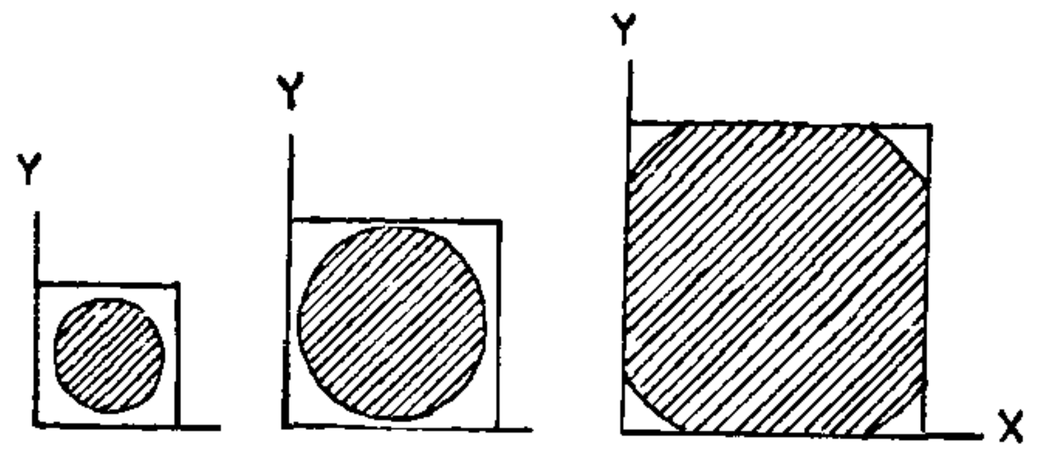
FIG. 1. Halftoning process. (*a*) Transmittance of screen-cell. (*b*) Transmittance after the incorporation of original image, (*c–e*) Transmittance of resulted halftone photograph corresponding to T_1^{th}, T_2^{th} and T_3^{th}.

This whole process can now be looked at from a different perspective—maintaining the threshold transmittance constant while varying halftone cell periods. Figure 2 (*a*) shows the resultant transmittance after the original image has been contact-printed for three different cells having different periods. Only one-dimensional projection is drawn here for reducing

the complicacy of three-dimensional visualization. The corresponding figure in 2 (*b*) shows the halftone transmittance for the same threshold transmittance. It is to be noted that the patched region has transmittance 1, while the clear area has transmittance 0. For significantly higher transmittance the geometry is always circular.



2a.



2b.

FIG. 2. (*a*) Transmittances of cell having different cell-periods. (*b*) Halftone transmittances : patched region has transmittance 1, otherwise 0.

CONCLUSION

The dot corruption in circular halftone screen is depenent only on the threshold transmittance. It's more prominent when the film has a lower threshold value. Dot corruption, for similar reasons, can be expected to occur also in elliptical halftone dots.

For sufficiently sampled images circular shape is preserved to a great extent, and in undersampled image it takes an intermediate geometry between a circle and an octagon. This dissimilarities in the halftone picture will result in correspondingly different output in the spatial frequency plane[10]. Of course a portion of the corruption could be contributed by the scattering phenomenon of the halftone photograph, as described by Yule-Nielsen effect.[11] Circular or elliptical dot corruption could be minimized by selecting higher threshold transmittance and by ensuring a faultless contact printing.

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A SIMPLE COLORIMETRIC METHOD FOR THE DETERMINATION OF PARACETAMOL FROM BIOLOGICAL SPECIMEN

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ABSTRACT

A simple colorimetric method for the determination of paracetamol is described. The method is based on the measurement of the intensity of crimson colour produced when paracetamol is treated with 10% aqueous sodium hydroxide. No interference is caused by compounds such as phenacetin, aspirin, caffeine, oxyphenbutazone, barbiturates, hydrantoins and dextrapropoxyphen which are present in various analgesic formulations of paracetamol. The method is sensitive to concentrations as low as 25 μg/ml paracetamol with a reproducibility of $\pm$ 2%.

INCREASING incidences of self-inflicted paracetamol overdosage, single or in combination with other drugs such as oxyphen-butazone, dextropropoxyphen, phenacetin, salicylates and sulphadrugs, etc., are reported.[1] Paracetamol shares third in rank as a killer drug[2], barbiturates and aspirin-salicylate being the first and second. The differential absorbance procedure of Routh *et al.*[3], because of its relative